

The End of a Trail – The Cheetah in India. Divyabhanusinh. Banyan Books, 59, Regal Building, Parliament Street, New Delhi 110 001, India. 1995. Hard cover 248 pp. Price not known.

The year 1997 commemorated fifty years of independence for India. Few remembered, however, that the year also marked five decades since a tragic event befell the new nation. Soon after independence, the magnificent cheetah *Acinonyx jubatus*, one of the swiftest animals to roam the Indian wilds, became extinct.

There is a poignant description of what was perhaps the final blow, certainly the last authenticated record of cheetahs in India, in this book. One night in 1947, in a vehicle driving through the countryside of Korea in Surguja District of Madhya Pradesh, Maharaja Ramanuj Pratap Singh Deo chanced upon three cheetahs. They were males, probably siblings of the same litter. The Maharaja shot them. The skins were then sent to the famous taxidermists, Messrs Van Ingen and Van Ingen in Mysore, with a request that the record be published in the *Journal of the Bombay Natural History Society*. It was published with a scathing comment from the editors that the cheetah was 'a rare and harmless animal (and these were) probably the last remnants of a dying race'.

The tragedy of the cheetah in India illustrates the problems of conserving large mammalian carnivores in modern landscapes. A species of vast open plains, grasslands and scrublands, the cheetah was a hunter of prodigious speed and grace, attacking prey animals such as the fleet-footed blackbuck and chinkara antelope through patient stalking followed by lightning chases. The openness of the habitat with little stalking cover, the need for year-round availability of prey, and competition with other carnivores, necessitated large home ranges over which they moved and lived. Over the centuries, as humans became increasingly dominating influences on the landscape, hunting and capturing cheetahs and their prey, cultivating and altering natural habitats, the wild populations of cheetah began to decline. As habitats shrank and populations declined, intrinsic traits of the

cheetah such as low breeding potential and genetic diversity, inability to find mates or denning sites to rear their young, may have taken a further toll.

What causes the decline and extinction of species? Is there any single dominating factor or many factors acting in tandem? A central challenge in modern conservation biology is to identify and understand factors causing species declines and extinction, which are increasingly common in today's world. In the absence of reliable knowledge, prudent management and conservation will be ineffective. The present precarious conservation status of other carnivores such as the wolf, snow leopard, tiger, and the Asiatic lion illustrates that there is much more to learn and do to secure the future of wild species in India.

This lavishly illustrated and well-researched book traces the saga of the cheetah in India from prehistoric and classical times through periods of Mughal and British rule, culminating in the pathetic finality of extinction in independent India. It is a unique attempt to trace the fate of a species in relation to ecological history and various factors over a long time span. The book draws substance from diverse sources spanning several centuries. These include cave shelter and Mughal paintings, classical Greek, Roman, and Sanskrit texts, photographs published or in private collections, trophies, accounts of coursing with cheetahs by Mughal emperors and princes, shikar tales from the British Raj, naturalistic writings, scientific papers, and distributional records. According to the author, if the account of the 'cheetah's passage through the ages... arouses some interest in the cheetah's protection (in other parts of the world) where it still exists, if it creates some interest for its reintroduction in India, it would have served its purpose'.

The first chapter describes the natural history and appearance of the cheetah, in comparison with its close cousin, the leopard *Panthera pardus*, with which it is often confused. While the short introduction (just over one page) may suffice for an informed reader, more detailed information on the cheetah in summarized form would have been valuable. Brief mention of its global distribution, taxonomic status, ecology, and behav-

our, (including African studies), as contrasted with other fields of savannah and forest habitats would have laid a sounder framework for the chapters that follow. That the cheetah is threatened in other parts of the world with the same fate it met within India adds wider context and significance to the ensuing chapters.

The second chapter deals with records from prehistoric cave paintings and classical Greek and Roman writings. The earliest irrefutable reference to the cheetah in classical literature, according to the author, appears in the 3rd century AD text on hunting, the *Cynegetica* by Oppianus Apanensis. Unfortunately, there is little good material from the early sources, made worse by leopards and cheetahs being often confused or given the same name in Greek and Roman texts. The author is thus led to say, 'while there is no clear evidence of cheetahs being recorded in India (in these sources) they were probably referring to them in some of the instances already cited'. Some of the material in this chapter and the next (dealing with pre-Mughal Hindu and Muslim records) could have been condensed or omitted altogether in view of the paucity of relevant information.

A fascinating portrayal of cheetahs during the rule of the Mughal emperors is the content of Chapter 4. Particularly interesting are the author's meticulous descriptions and analysis of the use of trained cheetahs to run down blackbuck antelope and other game – a hunting sport of the royalty called coursing. Coursing was practised in Hindu courts as early as the 12th century and in Muslim courts of north India prior to the arrival of the Mughals. With the arrival of the Mughals, there is a greater amount of detailed information in the form of paintings and writings, which the author skilfully interweaves into the tale. Interestingly, another smaller species of wild cat, the caracal *Felis caracal*, was also used for coursing. In an Appendix to the book the author describes hunting with caracal, a species that is also rare and endangered today.

Although there is no mention of the cheetah in Babur and Humayun's autobiographies, the author's diligent research helped uncover a painting showing Humayun and Shah Tahmasp hunting in Persia, with a cheetah clearly

illustrated. This chapter is peppered with amazing nuggets of information. For example, it describes the meticulous record kept by Jehangir of his hunting 28,352 animals over a 38-year period, the first record of cheetahs breeding in captivity in 1613, the game hunts in the Palam area of Delhi in 1619 where the airport stands today, the areas earmarked within the empire for cheetah procurement, and so on. The Mughal paintings reproduced as colour plates offer the reader a glimpse of the era and the spectacular sport of coursing.

The purpose of any historical sketch should be not so much to accurately describe as to incisively examine cause and consequence, to tease apart cultural and political, psychological and ecological processes that created the historical events. The present book offers excellent descriptions and analyses of historical events pertaining to the cheetah, and opens up new arenas for more incisive analyses of the factors leading to its decline and eventual extinction. What was the intensity of procurement of cheetahs from the demarcated areas of the empire and how did it affect their populations? Akbar, according to the *Iqbalnama*, is reputed to have procured over 9000 cheetahs. Jehangir recounts that Akbar had 1000 cheetahs in his menagerie. How credible could these claims possibly be and what happened to the animals in the royal menagerie with the fall of the Mughal empire? Was the low breeding potential of cheetahs a significant factor in their decline or was it dominated by other forces? How were the historical changes in human populations, cultures, kingdoms, agricultural practices, and hunting linked to the creation or destruction of open habitats and prey base of cheetahs?

With the rise of British dominion, the peculiar cultural association between humans and cheetahs waned, as did the wild populations of cheetahs. In Chapter 5, the author makes a not entirely convincing case that the cheetah was not a major item on the *shikar* agenda of the British, who also did not take to the sport of coursing as it was too 'passive' for them. Recent analysis of archival records (in a forthcoming paper by Mahesh Rangarajan) of bounties paid for killing cheetahs indicates that the role of the British in the extermination of cheetahs may not have been entirely

'inadvertent'. Another conclusion derived by the author from records of the British period is, however, particularly insightful. With shrinking habitats, hunting, and an increasing scarcity of wild prey, the cheetahs were forced into sub-optimal habitats (even dense jungle) and began to prey on village livestock. This feature, common even today for many endangered species, highlights a point that conservationists cannot afford to forget. Existing refuges for endangered species may not always contain the best habitats for them. Instead, they may only represent areas most sheltered from the inimical forces causing their endangerment.

After an inevitably brief chapter on the cheetah in independent India, there is a fascinating chapter on the trapping, training, handling, and coursing of cheetahs that will be of particular interest to technicians in modern zoos and historians. The two succeeding chapters are about African cheetahs brought into Asia and the taxonomic status of African and Asian cheetahs. The author points out that the minor sub-specific differentiation of African and Asian cheetahs (chiefly in the tail tip being black in the Asian race vs white in the African) is more a result of 'historical observation rather than of any taxonomic study'. Chapter 10 presents a depressing and eye-opening review of the status of the cheetah in Asia, where the species has virtually disappeared from all countries except Iran, where some 50 to 200 individuals may survive. Highlighting that the need to protect it there is paramount, the author says 'how many will be available for reintroduction in India is another matter'.

The last chapter, which is perhaps the most important one from the standpoint of the stated purpose of the book, is one of the shortest (four pages). The analysis of the causes of decline and extinction of cheetahs, some of which is in earlier chapters and some in Appendix F (Chronology of Extinction) could have been comprehensively compiled and addressed here. A direct comparison with the other large carnivores, the lion and wolf, which are highly endangered today, would have been valuable in evaluating the relative importance of different causative factors in triggering the extinction of cheetahs. Of particular interest to conservationists would be the

plan to reintroduce cheetahs in India, formulated by M. K. Ranjitsinh, and described by the author. The given outline of the plan is clearly sketchy and preliminary but deserves serious consideration and further study. As a prerequisite, however, it is necessary to objectively assess the feasibility and desirability of reintroduction. One must learn from earlier successes as well as avoid past mistakes (such as lack of scientific monitoring and planning, and working with inadequate knowledge of the species' ecological requirements) which led to failures of projects such as the lion reintroduction in Chandraprabha in 1957.

With worldwide concern today over preventing extinctions and conserving natural ecosystems, the content of the book is timely and relevant. Its multidisciplinary nature makes it a useful reference for historians, wildlife enthusiasts, ecologists, conservationists, managers, and policy makers. There are only a few minor typographical and stylistic errors, including misspelling of scientific names of some species (for instance, the blackbuck *Antelope cervicapra*). The elegant format of the book, with the large number of plates and illustrations, make the book as attractive as it is informative. Anyone who buys this book is unlikely to regret it.

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Venom Phospholipase A₂ Enzymes: Structure, Function and Mechanism. R. Manjunatha Kini, ed. John Wiley and Sons. 1997. 511 pp. Price: US\$70.

Phospholipases are classified according to the position of the bond which they hydrolyse in a phospholipid molecule. Thus, we have phospholipases A₁ which are widely distributed in nature and hydrolyse sn-1 position in the phospholipid. Phospholipases A₂ are ubiquitous in nature; attack 'phospholipids at the sn-2 position of the glycerol backbone, releasing lysophospholipids and fatty